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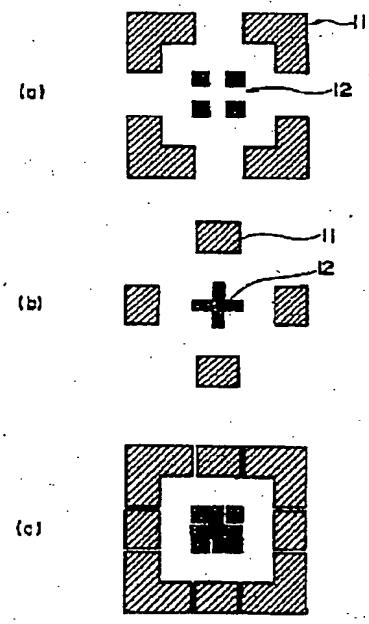
# (54) LIQUID CRYSTAL DISPLAY DEVICE AND ITS PRODUCTION

(57) Abstract:

PURPOSE: To provide the liquid crystal display device with which precise sticking of substrates to each other is possible.

CONSTITUTION: This liquid crystal display device is constituted by disposing a pair of the substrates formed with electrodes at a specified spacing and sealing a liquid crystal therebetween. The above-mentioned liquid crystal display device has alignment marks 11 for rough alignment and alignment marks 12 for precise alignment provided within these alignment marks 11.





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[Claim(s)]

[Claim 1] In the liquid crystal display which the substrate of the couple with which the electrode was formed was made to counter at fixed spacing, and confined liquid crystal between them The liquid crystal display characterized by having the alignment mark which carries out alignment to the precision prepared on the field where these both substrates counter in the alignment mark which carries out alignment of these both substrates to **, and this alignment mark.

[Claim 2] In the manufacture method of the liquid crystal display which is made to counter at fixed spacing and confines liquid crystal between them after carrying out alignment of the substrate of a couple with which the electrode was formed The manufacture method of the liquid crystal display characterized by making alignment the precision prepared on the field where these both substrates counter in the alignment mark which carries out alignment of these both substrates to **, and this alignment mark using the alignment mark which carries out alignment.

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the still more detailed lamination method with a precise substrate about a liquid crystal display and its manufacture method.

[0002]

[Description of the Prior Art] The liquid crystal display prepared the liquid crystal layer between two substrates which have an electrode inside and counter it, and generally, when sticking both substrates, alignment of the electrode of both substrates needed to be carried out, and although, after it expanded and carried out alignment of the electrode pattern of both substrates under viewing or a microscope conventionally, it was performing lamination.

[0003] However, since it is not a configuration for the pattern of a picture element electrode itself to carry out highly precise alignment greatly, Picture element density became high by the request of the high-definition image in recent years, that is, by the method of carrying

out alignment of the conventional electrode pattern, there was a problem that it was difficult for highly precise lamination, for example, alignment accuracy, to perform lamination of **2 micrometers or less as pixel area became small.

[0004] On the other hand, there is alignment at the time of patterning in a semiconductor process as an analogous art of the above-mentioned alignment.

[0005] The enlarged drawing of the alignment mark of the sectional view of a semiconductor process to drawing 6 is shown in drawing 5 . As for a resist and 26, in drawing 5 and drawing 6 , semi-conductor substrates, such as Si, and 24 are [ a shielding layer and 28 ] light, such as UV light, mask substrates, such as a quartz, and 27 an internal pattern and 25 the alignment mark for alignment with rough 21, the alignment mark for alignment with highly precise 22, and 23.

[0006] When patterning after the semi-conductor substrate 23 in a semiconductor process, alignment is performed after applying a resist 25 to this semi-conductor substrate 23. In that case, as shown in drawing 5 and drawing 6 R> 6, the rough alignment mark 21 for alignment and the highly precise alignment mark 22 for alignment are formed independently. Alignment was first performed rough by the former alignment mark 21 using the microscope of viewing or low magnification, next, the latter alignment mark 22 was used under the microscope of high magnification, highly precise alignment was performed, and it was patterning by exposing a resist 25.

[0007]

[Problem(s) to be Solved by the Invention] However, by the alignment method in the above-mentioned semiconductor process, when observing an alignment mark, in order to raise alignment accuracy, it is necessary to observe under the microscope of high magnification. When the microscope of this high magnification was used, the visual field range became narrow, and there was a trouble that looking for the alignment mark on a substrate took time amount.

[0008] Moreover, since two kinds (a total of four pieces) of alignment marks of a couple will be formed each in a separate place at the lowest and a so big area in addition to element formation is needed when the method of starting is applied to the lamination of the substrate of a liquid crystal display, there is a trouble that cell size becomes large. Especially in liquid crystal displays with dramatically small cell size, such as a view finder, since it is creating by separating two or more cels from a big substrate, the more the size of a cel is small, the more the number of cels which can be taken from one substrate increases. Therefore, it is tended to make area other than element formation as small as possible, and they poses a big problem.

[0009]

[Means for Solving the Problem] This invention solves the above-mentioned conventional trouble, and it aims at offering the inexpensive liquid crystal display which could do alignment for a short time, and was excellent in mass production nature with much picking number of a cel, and its manufacture method.

[0010] Namely, this invention makes the substrate of a couple with which the electrode was formed counter at fixed spacing, and is set to the liquid crystal display which confined liquid

crystal between them. The alignment mark which carries out alignment of these both substrates to ** on the field where these both substrates counter, The liquid crystal display characterized by having the alignment mark which carries out alignment to the precision prepared in this alignment mark, And after carrying out alignment of the substrate of a couple with which the electrode was formed, make it counter at fixed spacing and it sets to the manufacture method of the liquid crystal display which confines liquid crystal between them. It is the manufacture method of the liquid crystal display characterized by making alignment the precision prepared on the field where these both substrates counter in the alignment mark which carries out alignment of these both substrates to **, and this alignment mark using the alignment mark which carries out alignment.

[0011]

[Example] An example explains this invention to a detail hereafter.

[0012] Drawing 1 is the sectional view of the liquid crystal display of this invention example. in drawing 1 -- 1 -- as for the orientation film and 5, an upper substrate, 3, and 7 are [ a lower substrate and 9 ] sealants liquid crystal and 8 an electrode, 4, and 6 an alignment mark and 2.

[0013] Drawing 2 is the enlarged drawing of the alignment mark 1, and drawing 2 (a) is the alignment mark formed in the upper substrate 2, the alignment mark which was formed in the lower substrate 8 as for drawing 2 (b), and an alignment mark [ in / in drawing 2 (c) / an alignment state ]. In drawing 2 , the alignment mark for alignment with rough 11 and 12 are the highly precise alignment marks for alignment. Here, the configuration of an alignment mark is not limited in particular, if only it forms the highly precise alignment mark 12 for alignment in the alignment mark 11 rough interior for alignment. Therefore, as a configuration as shown in drawing 3 is sufficient and it is shown in drawing 4 , you may form the highly precise alignment mark 12 for alignment using a part of rough alignment mark 11 for alignment. In addition, in drawing 3 and drawing 4 , (a) is the alignment mark formed in the upper substrate 2, the alignment mark by which (b) was formed in the lower substrate 8, and an alignment mark [ in / in (c) / an alignment state ].

[0014] The up-and-down substrate 2 and the lamination method of 8 are explained. First, a microscope is made into low magnification and alignment is rough performed by the rough alignment mark 11 for alignment. Next, the scale factor of a microscope is changed, it is considered as high magnification, highly precise alignment is performed using the highly precise alignment mark 12 for alignment, and both substrates are stuck by the sealant 9. Then, liquid crystal 5 is poured in and it is considered as a liquid crystal display.

[0015] In being easily detectable, the alignment highly precise only by changing the scale factor of a microscope of the alignment mark of this example becomes possible, without looking for a highly precise alignment mark after rough alignment. Therefore, the time amount which alignment takes can be shortened substantially.

[0016] Moreover, since the highly precise alignment mark 12 for alignment is formed in the alignment mark 11 rough interior for alignment, area for alignment formation can be made small and the cutback of cell size is attained.

[0017]

[Effect of the Invention] [ easy operation of changing the scale factor of a microscope ] after carrying out alignment of the up-and-down substrate to ** by the rough alignment mark for alignment like explanation above in an alignment mark's being able to detect easily according to this invention A highly precise alignment mark can be observed and highly precise alignment becomes possible. Therefore, the time amount which alignment takes can be shortened substantially and the cost cut of a liquid crystal display is attained.

[0018] Moreover, since area which forms an alignment mark can be made small, in a liquid crystal display cell, especially the liquid crystal cell for view finders, cutback-ization of the area of a cel is attained and many cels can be taken from one substrate.

[0019] Therefore, miniaturization low cost-ization of the liquid crystal display using such a liquid crystal cell is attained.

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[Brief Description of the Drawings]

[Drawing 1] The sectional view of the liquid crystal display of this invention.

[Drawing 2] The enlarged drawing of the alignment mark of this invention example.

[Drawing 3] The enlarged drawing of the alignment mark of an example besides this invention.

[Drawing 4] The enlarged drawing of the alignment mark of an example besides this invention.

[Drawing 5] The sectional view of a semiconductor process.

[Drawing 6] The enlarged drawing of an alignment mark used for a semiconductor process.

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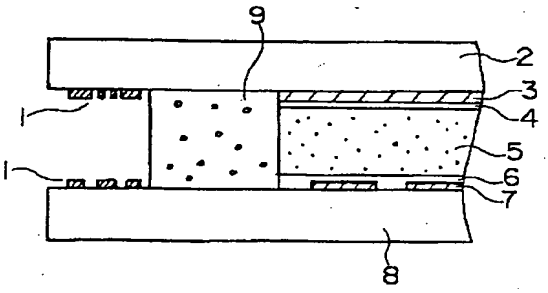
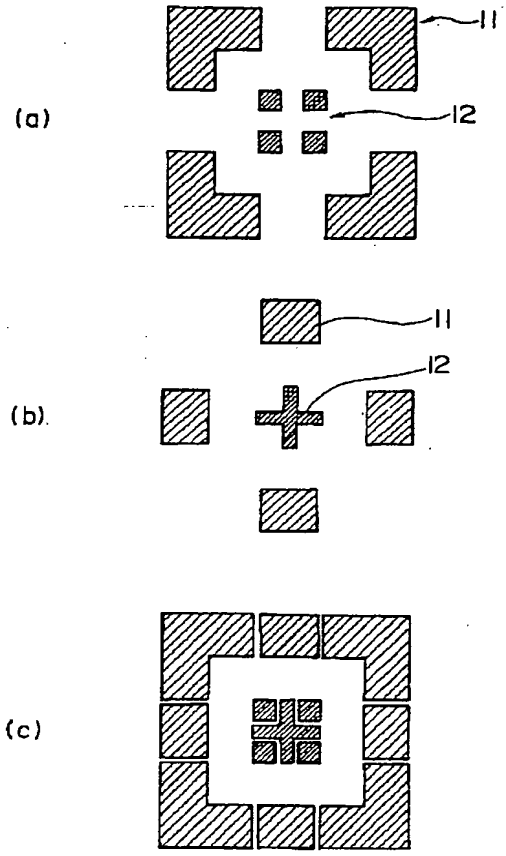
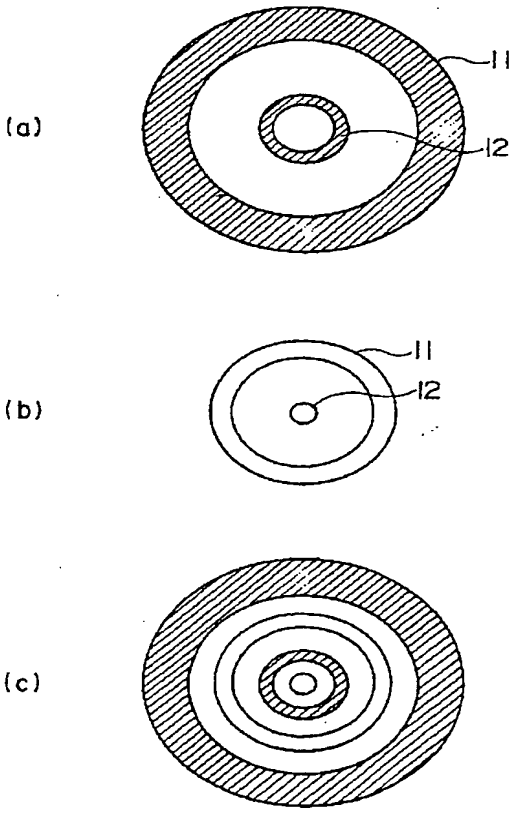
[Drawing 1]



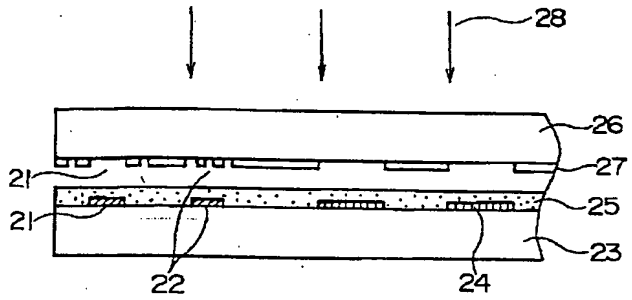

[Drawing 2]



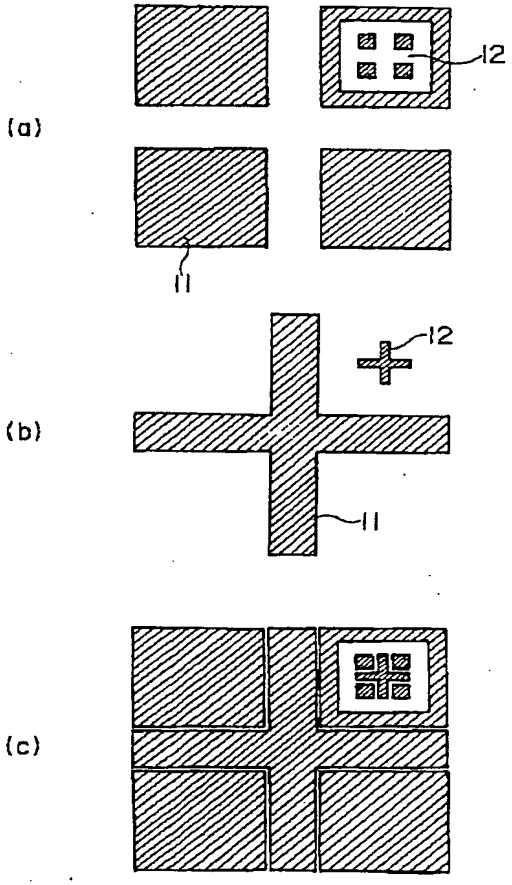

[Drawing 3]



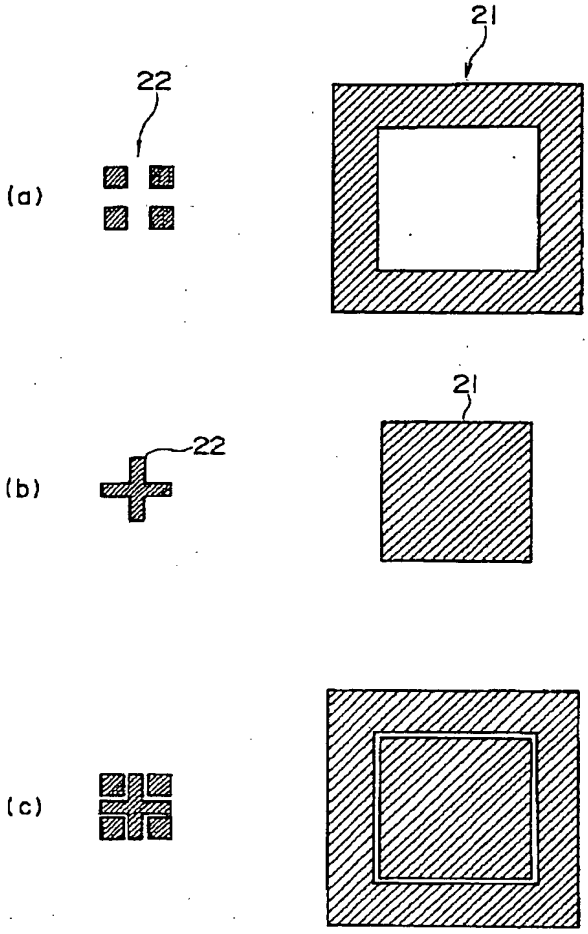

[Drawing 5]




[Drawing 4]




[Drawing 6]

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